Cenovus Energy Inc.
Christina Lake In-situ Progress Report
Scheme 8591
2022 update

June 30, 2023

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Oil & gas and financial information

Oil & gas information

The estimates of reserves were prepared effective December 31, 2022. All estimates of reserves were prepared by independent qualified reserves evaluators, based on definitions contained in the Canadian Oil and Gas Evaluation Handbook and in accordance with National Instrument 51-101 *Standards of Disclosure for Oil and Gas Activities*. Additional information with respect to pricing and additional reserves and other oil and gas information, including the material risks and uncertainties associated with reserves estimates, is contained in our AIF and Form 40-F for the year ended December 31, 2022 available on SEDAR at www.sedar.com, EDGAR at www.sec.gov and on our website at cenovus.com.

Certain natural gas volumes have been converted to barrels of oil equivalent (BOE) on the basis of one barrel (bbl) to six thousand cubic feet (Mcf). BOE may be misleading, particularly if used in isolation. A conversion ratio of one bbl to six Mcf is based on an energy equivalency conversion method primarily applicable at the burner tip and does not represent value equivalency at the well head.

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Advisory

This presentation contains information in compliance with:

AER Directive 054 - Performance Presentations, Auditing, and Surveillance of In Situ Oil Sands Schemes

This document contains forward-looking information prepared and submitted pursuant to Alberta regulatory requirements and is not intended to be relied upon for the purpose of making investment decisions, including without limitation, to purchase, hold or sell any securities of Cenovus Energy Inc.

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Subsection 4.1 1 Introduction

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CENOVUS AT A GLANCE

TSX, NYSE | CVE

Market capitalization	**$45 billion**
2023E production	**800 MBOE/d**
• Oil Sands	**612 Mbbls/d**
• Conventional	**133 MBOE/d**
• Offshore	**62 MBOE/d**
Upgrading and refining capacity	**~745 Mbbls/d**
2022 proved & probable reserves	**8.9 BBOE**
Reserves life index	**~31 years**

Note: Market capitalization as at April 24, 2023. Values are approximate. Expected production based on April 25, 2023 guidance midpoints. Refining capacity represents net capacity to Cenovus.

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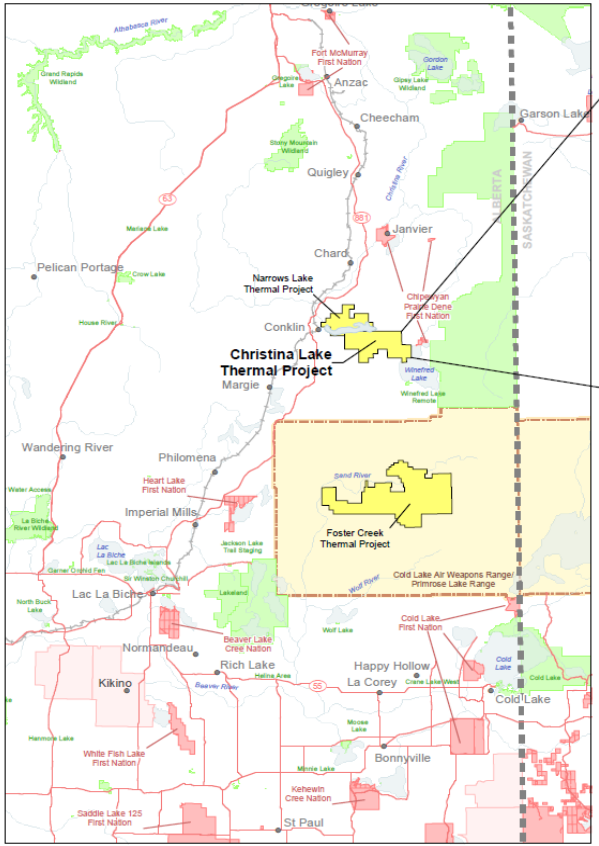
Area map



Expressway / Highway
Railway
Cenovus Project Area
Parks and Protected Areas
Cold Lake Air Weapons Range/ Primrose Lake Range
First Nation Reserve
Metis Settlements

0 20 40 60
Kilometres
1:1,200,000

NAD 83 UTM 12N
Page Size: 11x17

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CHRISTINA LAKE THERMAL PROJECT

CVE-0033-005
March 23, 2023

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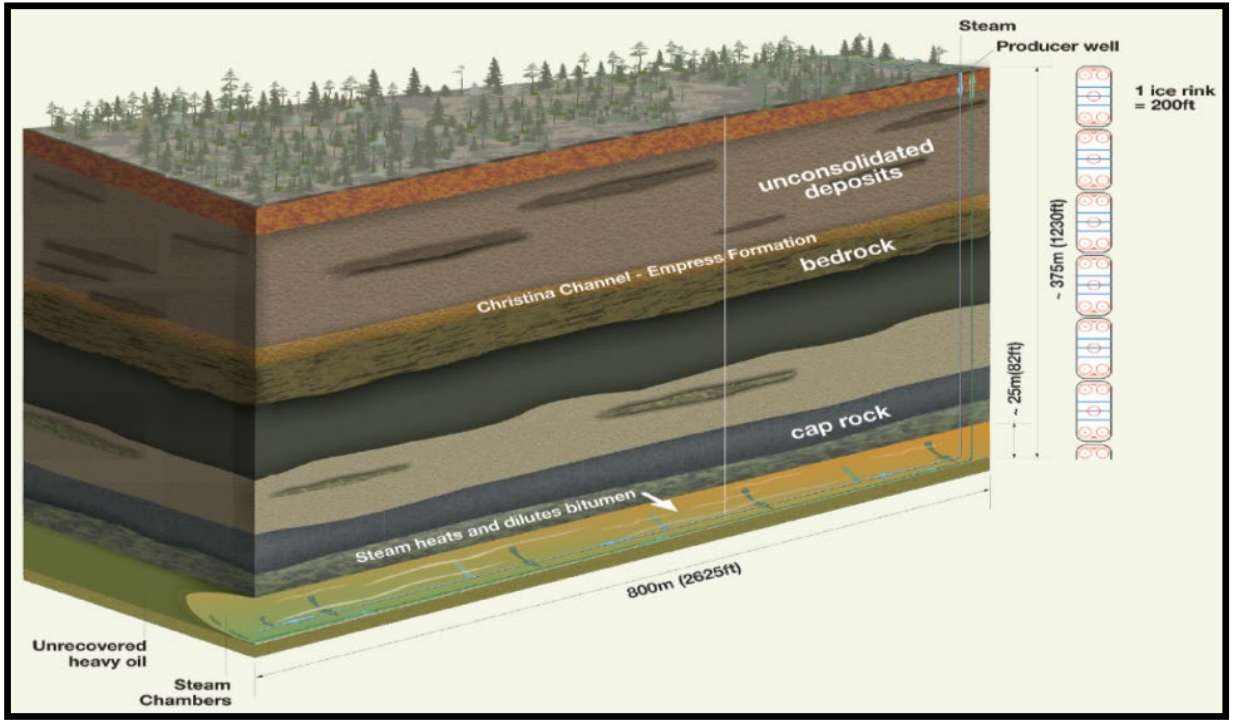
Recovery process

<u>Christina Lake Thermal Project</u>

Uses the dual-horizontal well SAGD (steam-assisted gravity drainage) process to recover oil from the McMurray formation

- Two horizontal wells one above the other approximately 5 m apart
- Steam is injected into the upper well where it heats the oil and allows it to drain into the lower well
- Oil and water emulsion pumped to the surface and treated



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Subsection 4.2 2-7 Subsurface

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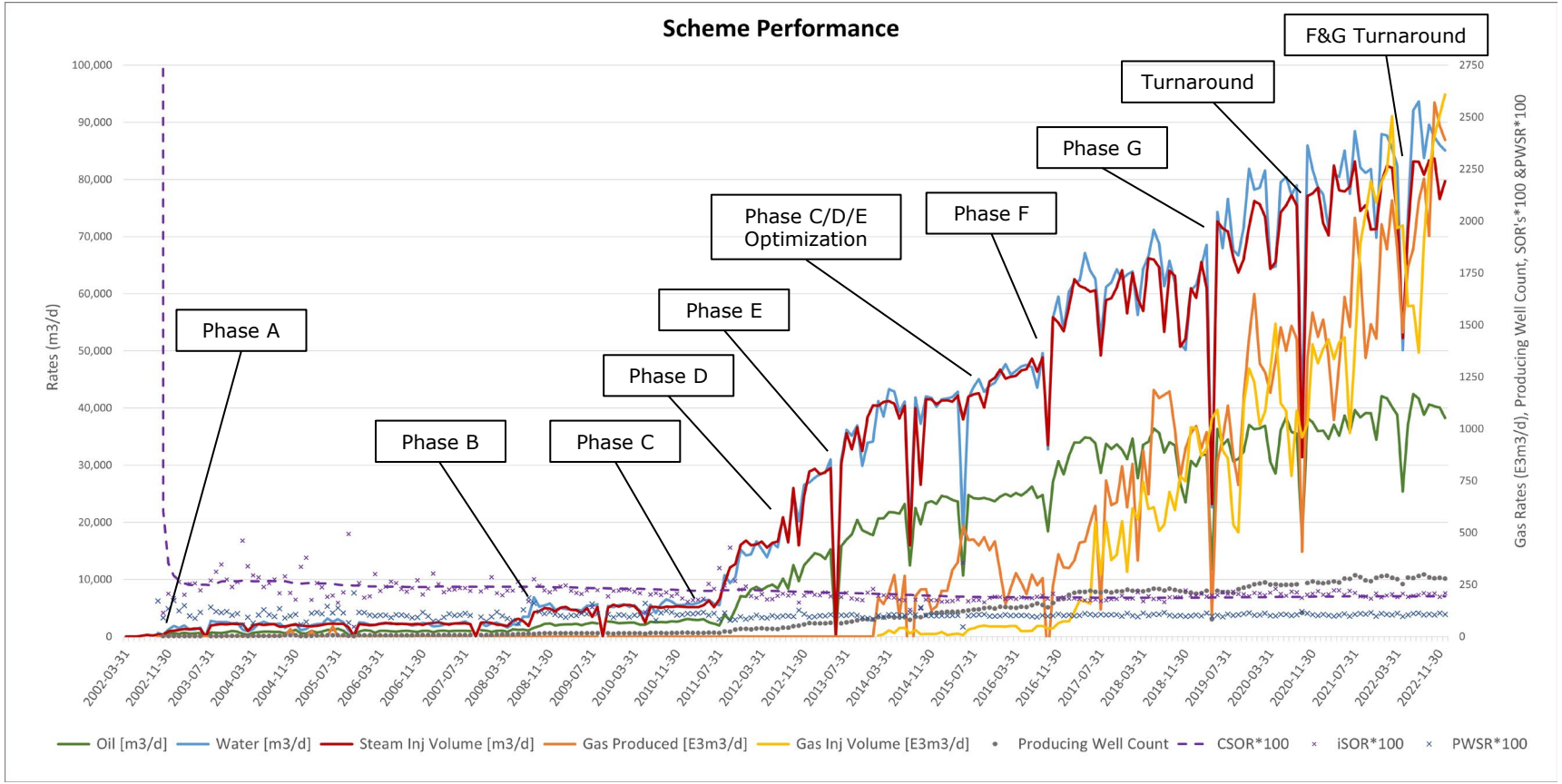
Performance: full historical



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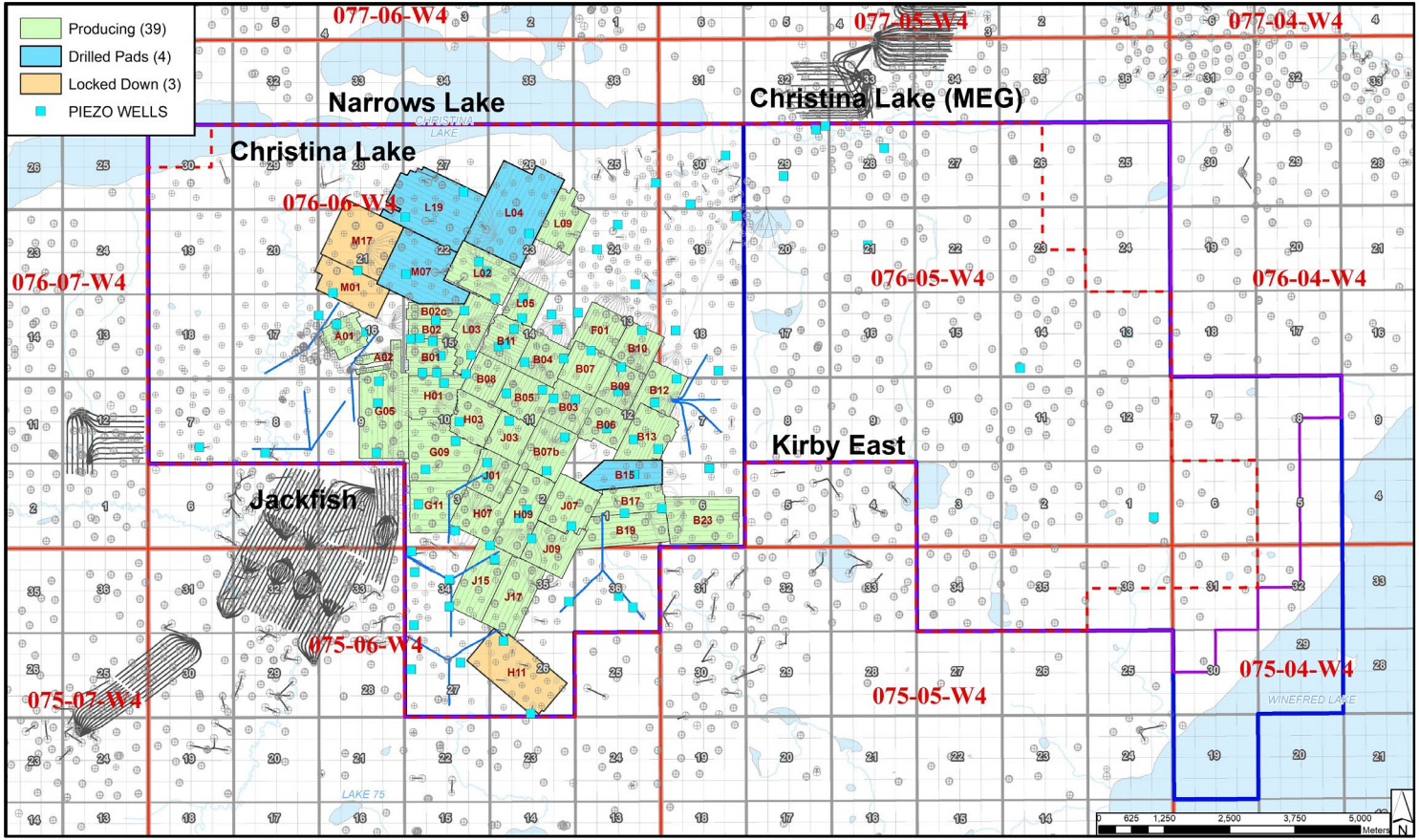
Scheme Map: Christina Lake



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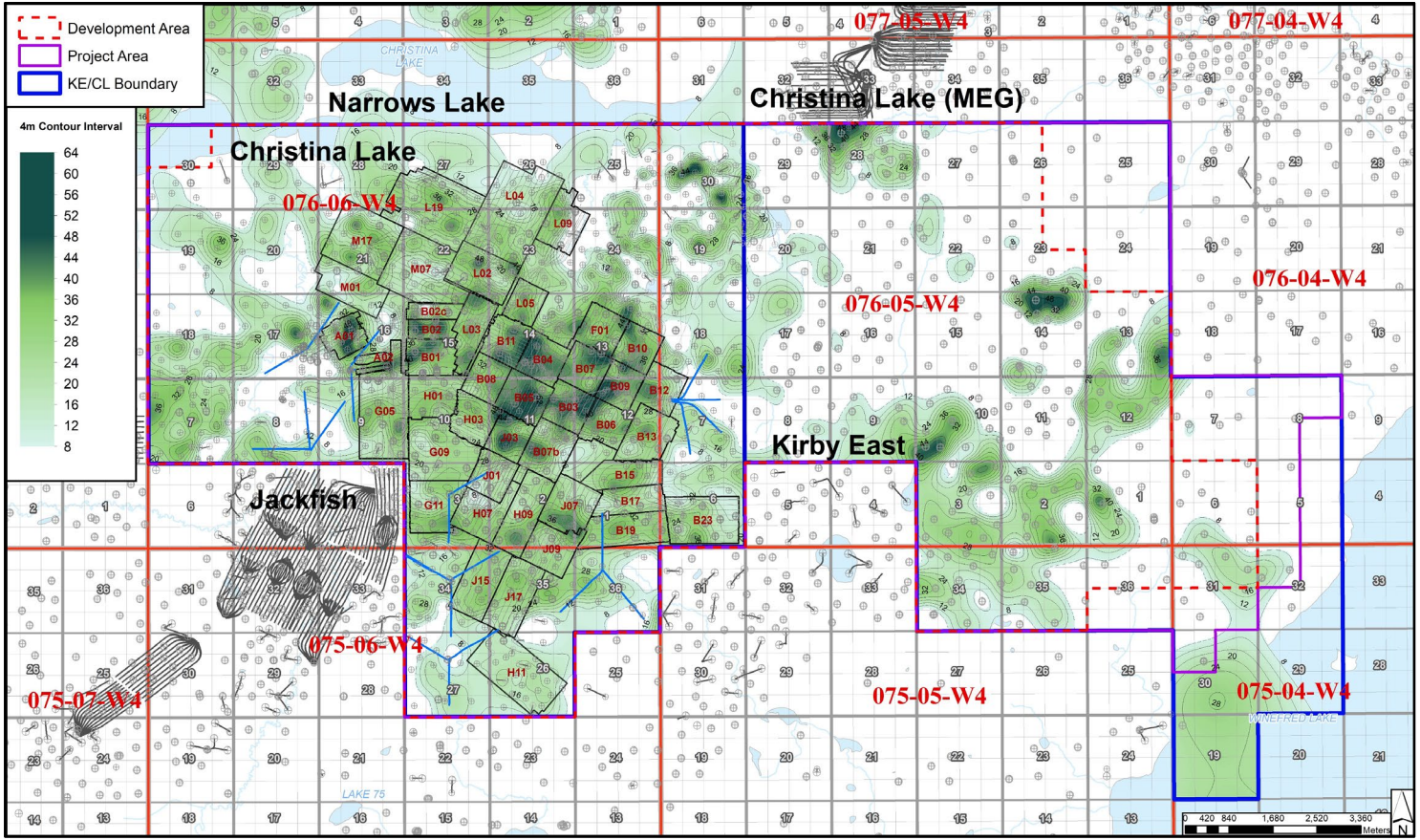
McM SAGD Pay Isopach Map (Main Zone)



McM SAGD Pay Cutoffs:

Gamma <60 API, Porosity >27%, Rt > 20 ohm-m (=So>50%)

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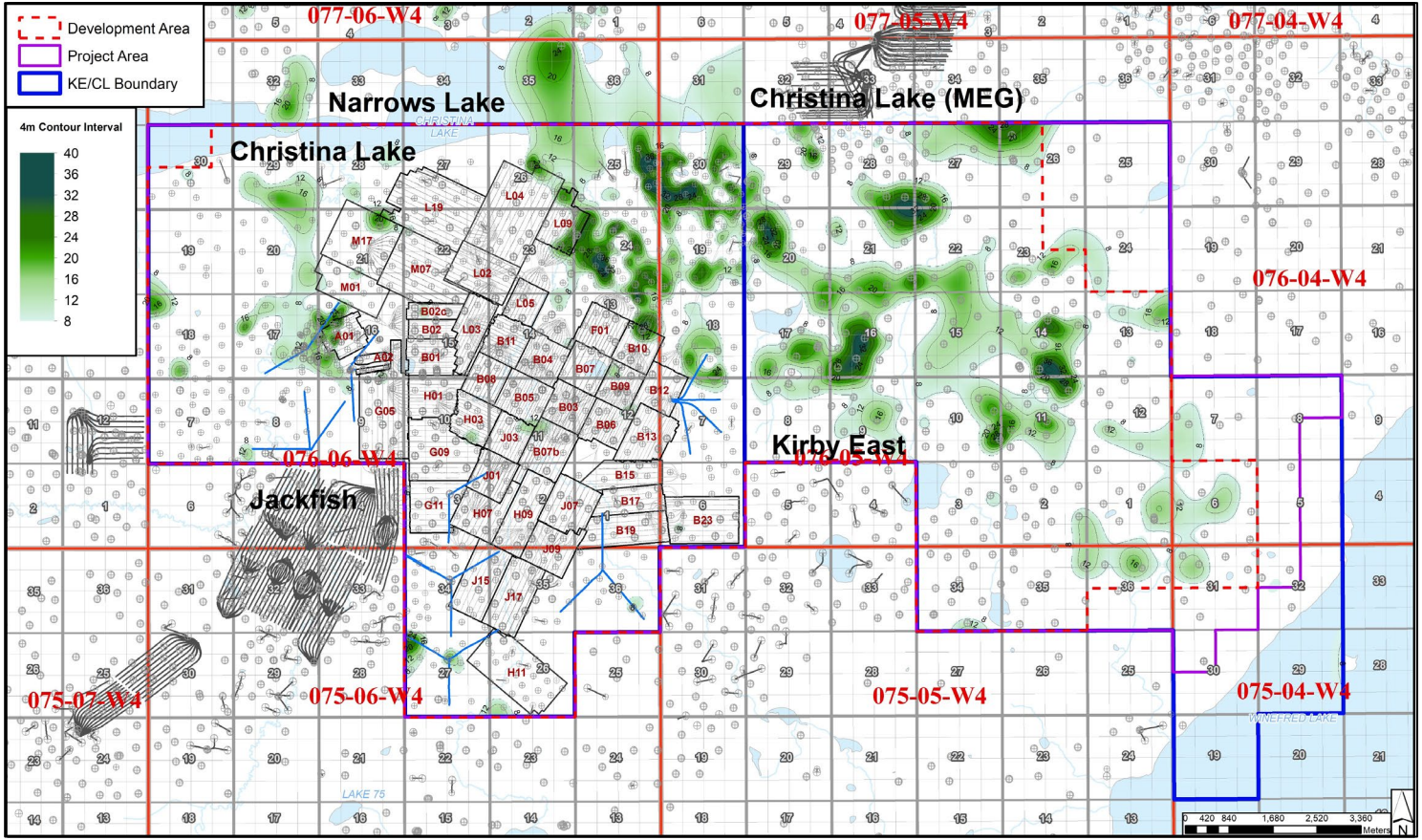
McM SAGD Pay Isopach Map (Upper Zone)



McM SAGD Pay Cutoffs:

Gamma <60 API, Porosity >27%, Rt > 20 ohm-m (=So>50%)

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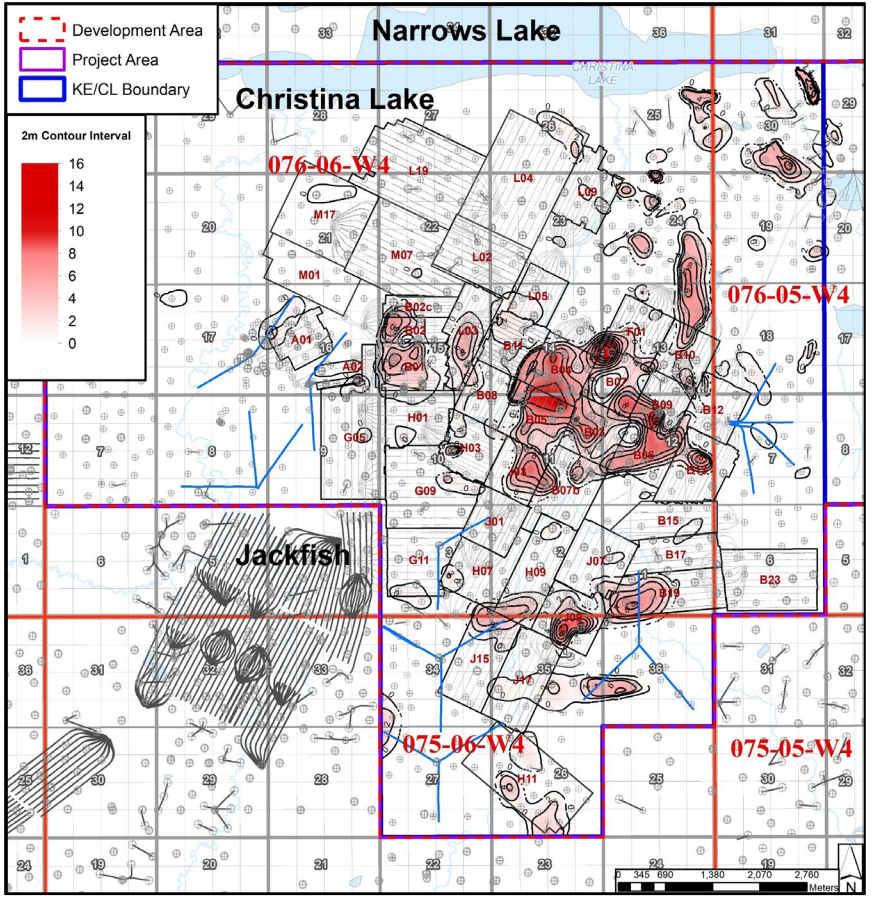
SAGD Top Gas Isopach

(2m contour interval)

3 main gas pockets:

- **'Sec 15'**
  - centered over Section 15
- **'11-14'**
  - centered over Section 11
- **'Southern'**
  - centered over Section 2



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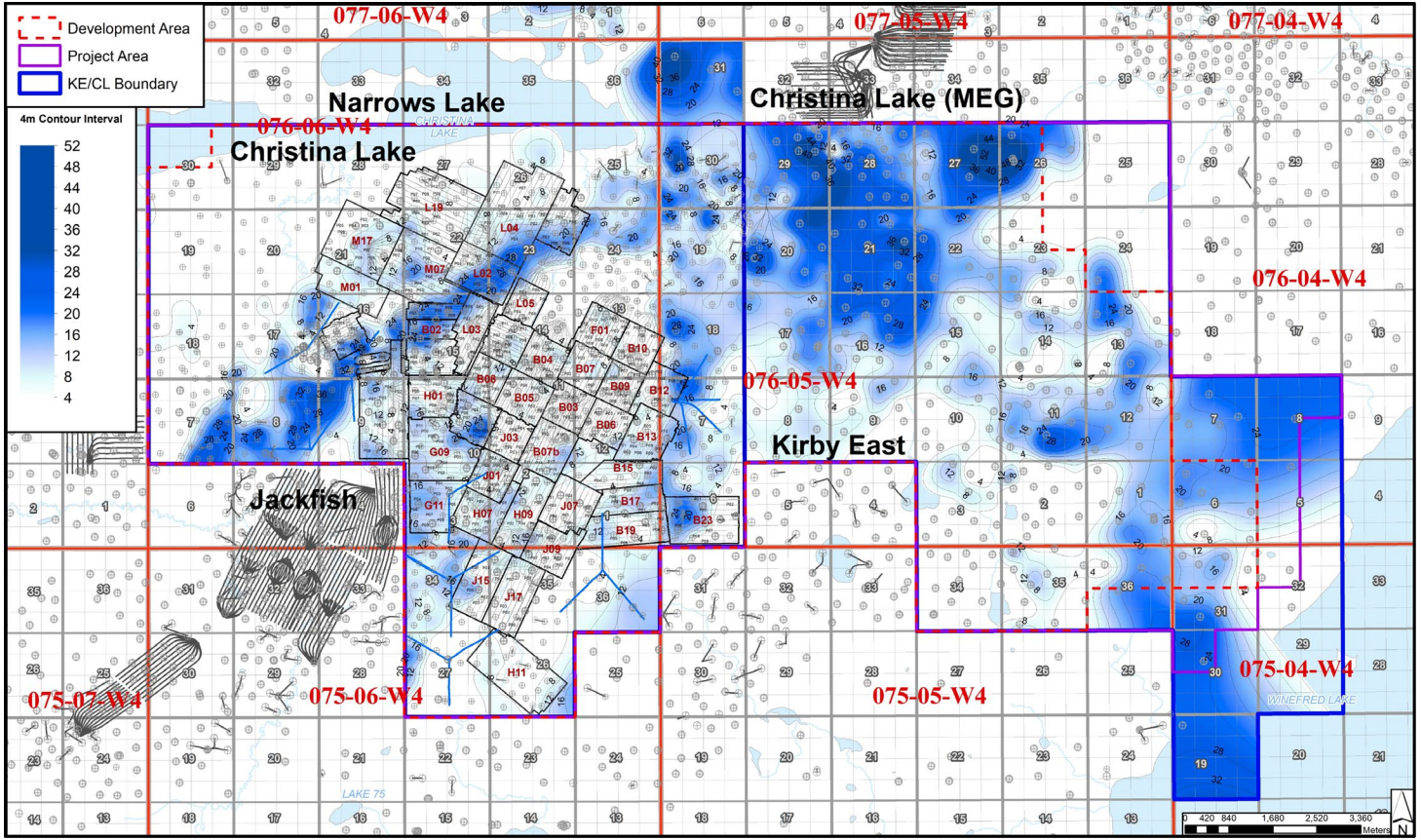
McMurray Water Isopach Map



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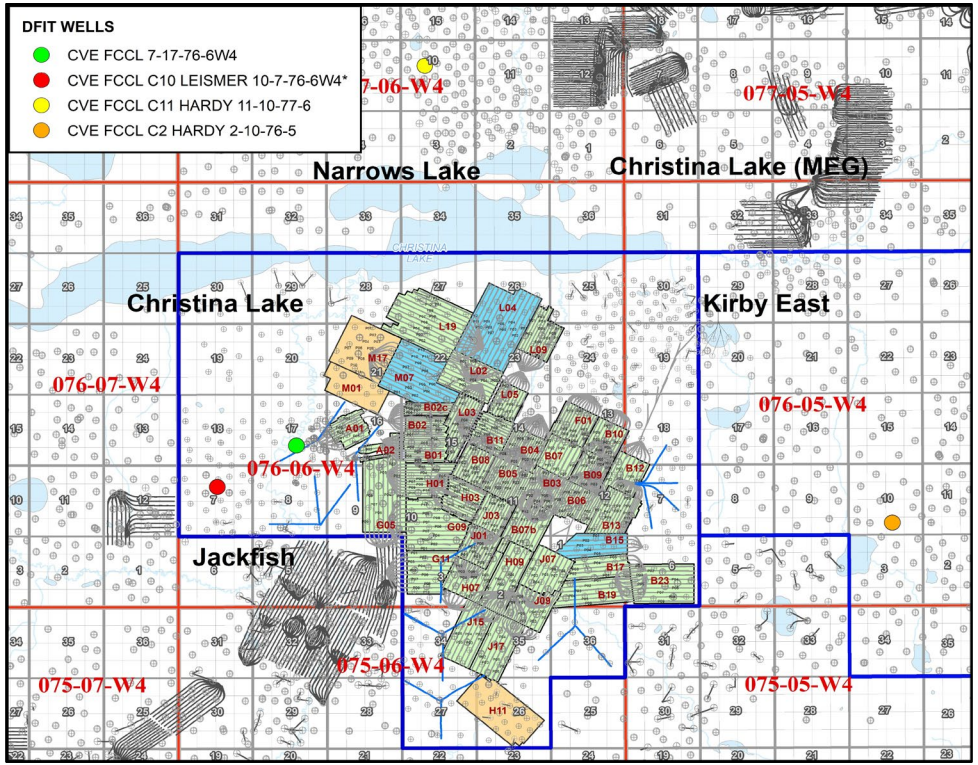
DFIT Wells

- CVE recognizes that tensile and shear failure are two possible ways for integrity to be compromised
- DFIT data gives insight about failure mechanisms and stress magnitudes.

- CVE FCCL 7-17-76-6W4
- CVE FCCL C2 HARDY 2-10-76-5
- CVE FCCL C11 HARDY 11-10-77-6
- CVE FCCL C10 LEISMER 10-7-76-6W4*

* This well was drilled in 2018. T21 is the caprock. Tested @328.25m, Closure Pressure 17.70 kPa/m

No new DFIT wells drilled in 2022.



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Surface heave monitoring

- Interferometric synthetic aperture radar (InSAR) surface heave monitoring at Christina Lake was deferred due to minimal observed historical vertical surface displacement (average +6.9 cm)
  - Deferral approved by the AER in 2018 (Scheme Approval No. 8591GGG)
- Cenovus has multiple subsurface monitoring tools as alternatives to using InSAR data
  - Observation well network monitors pressure and temperature above and below the primary caprock. This network is connected through an internal surveillance monitoring dashboard and is viewed regularly by integrated pad teams
  - Real-time well head and bottom-hole injection pressure monitoring
  - Multiple 4-D seismic acquisitions over the lifecycle of the well pads

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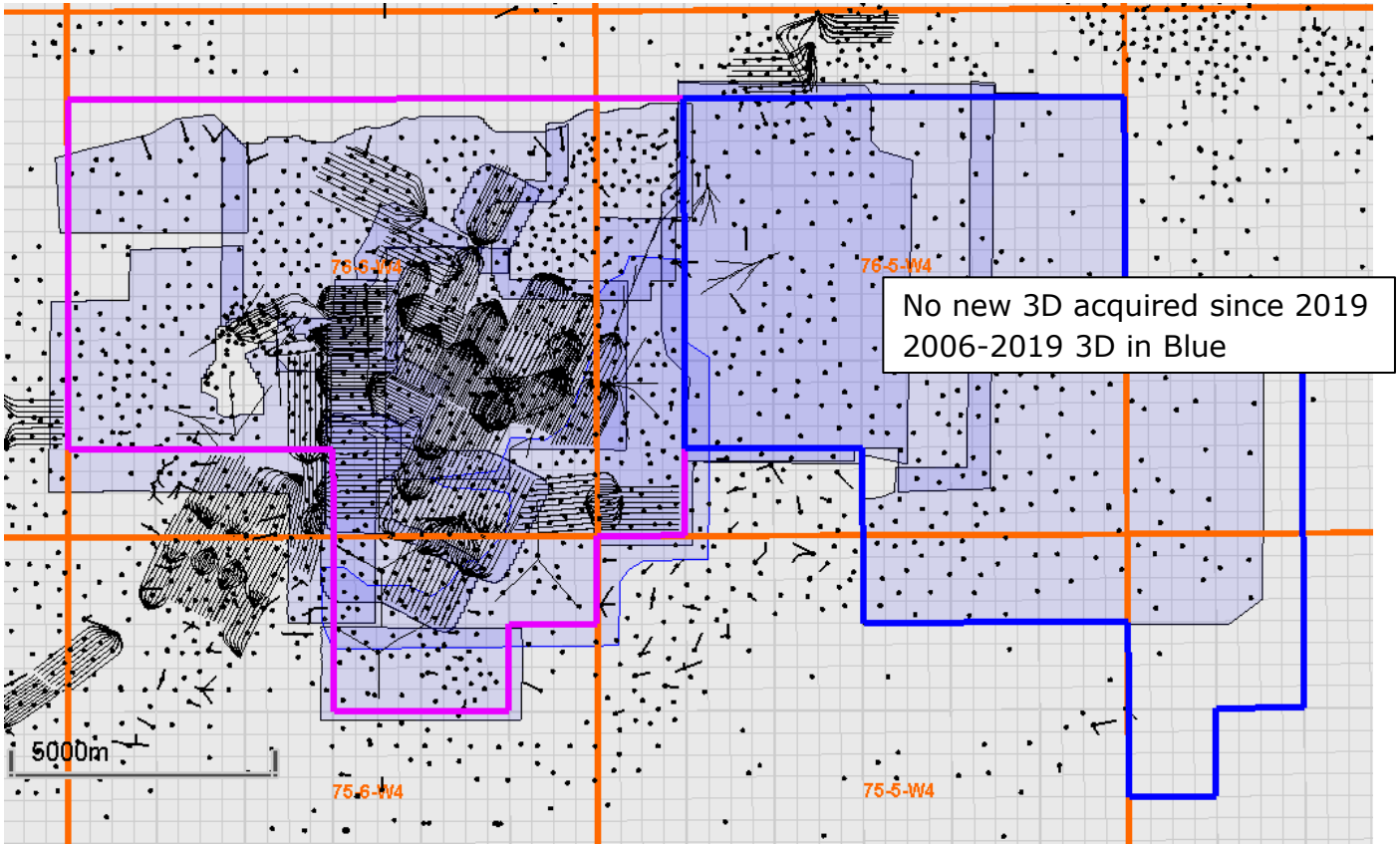
3D Seismic within Project Area



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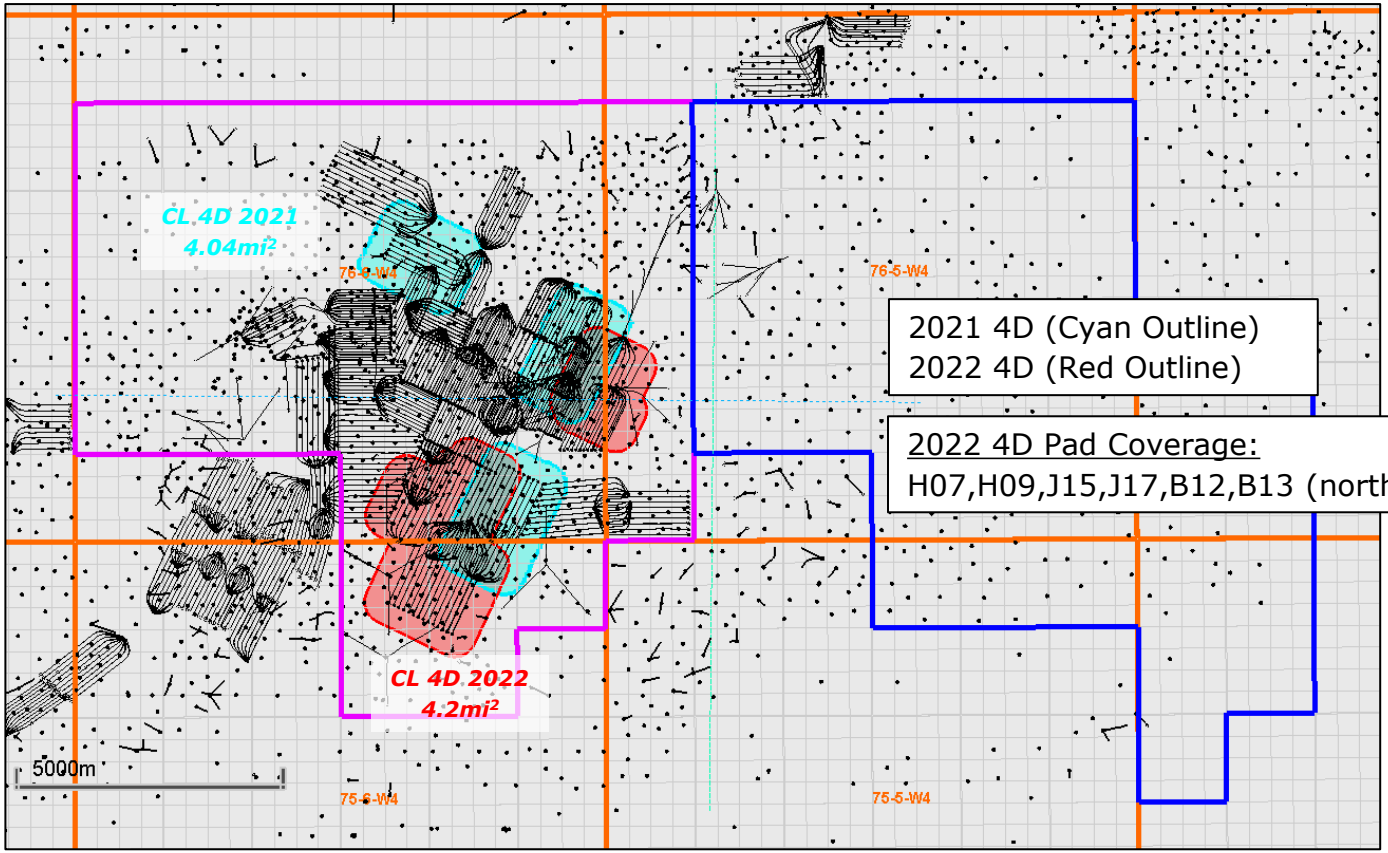
4D Seismic within Project Area



2021 4D (Cyan Outline)
2022 4D (Red Outline)

2022 4D Pad Coverage:
H07,H09,J15,J17,B12,B13 (northern half)

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Cross-section (structural): north

A

A′

WBSK (T21)

T11

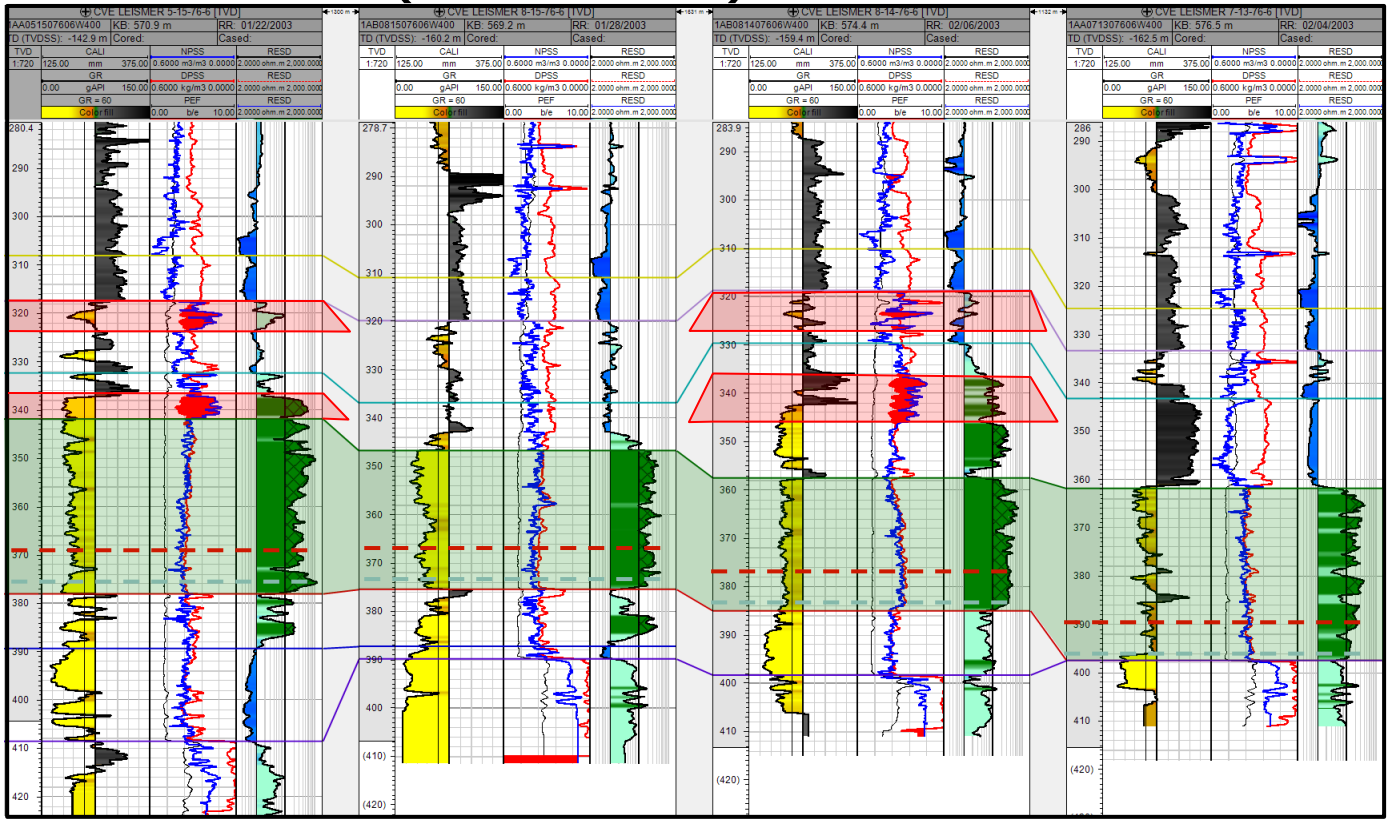
MCMR

SAGD Pay

SAGD Base

Water Top

Paleo

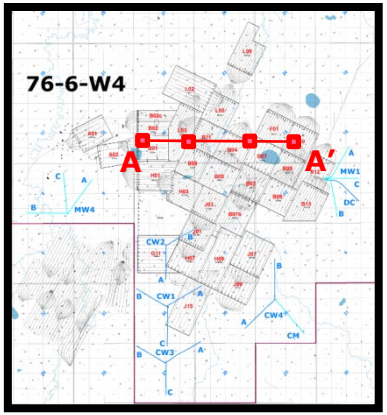


Identified Gas

McM SAGD Pay

Injector Level (est.)

Producer Level (est.)



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Cross-section (structural): mid

B

B′

WBSK (T21)

T11

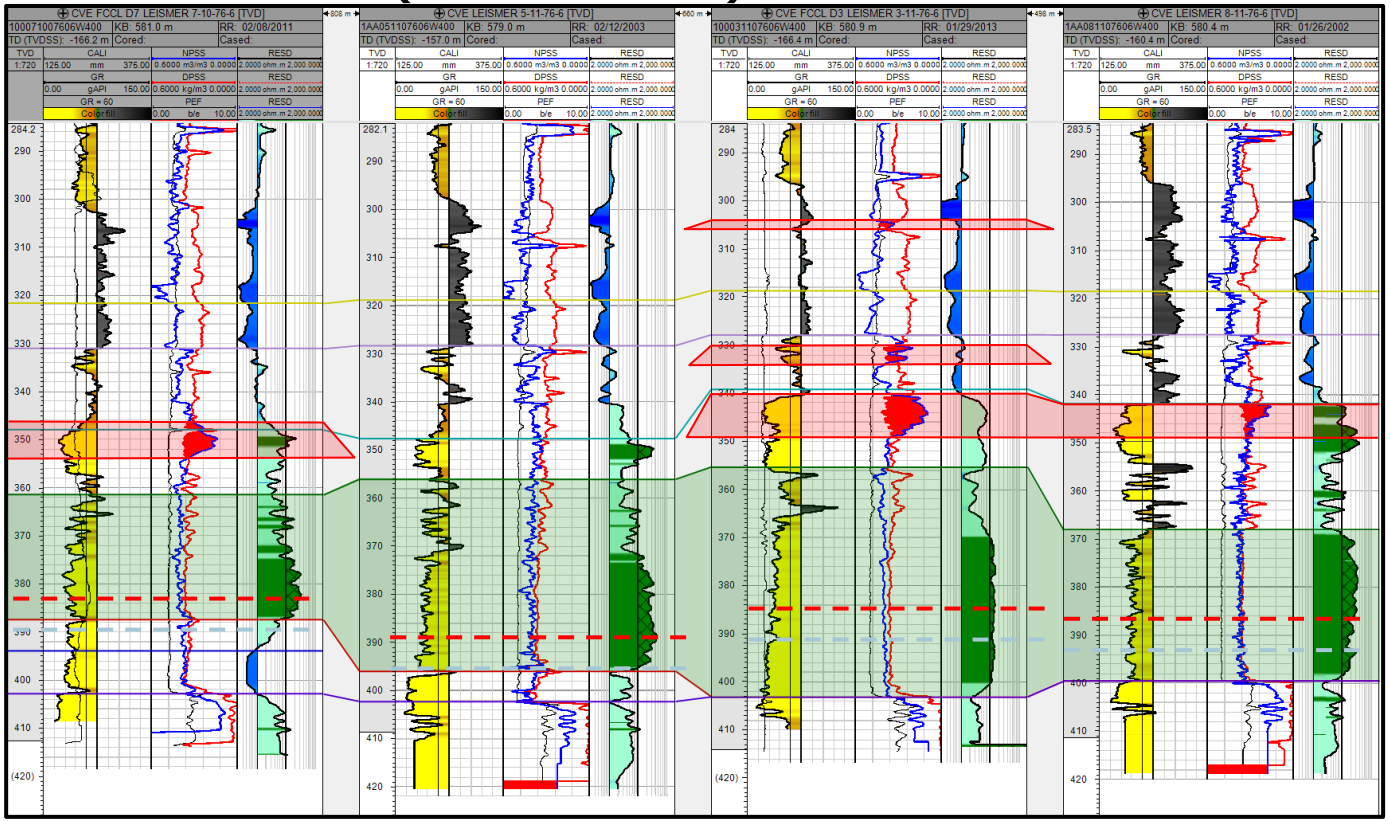
MCMR

SAGD Pay

SAGD Base

Water Top

Paleo

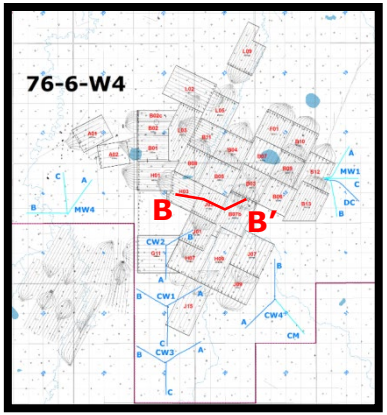


Identified Gas

McM SAGD Pay

Injector Level (est.)

Producer Level (est.)



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Cross-section (structural): south

C

C′

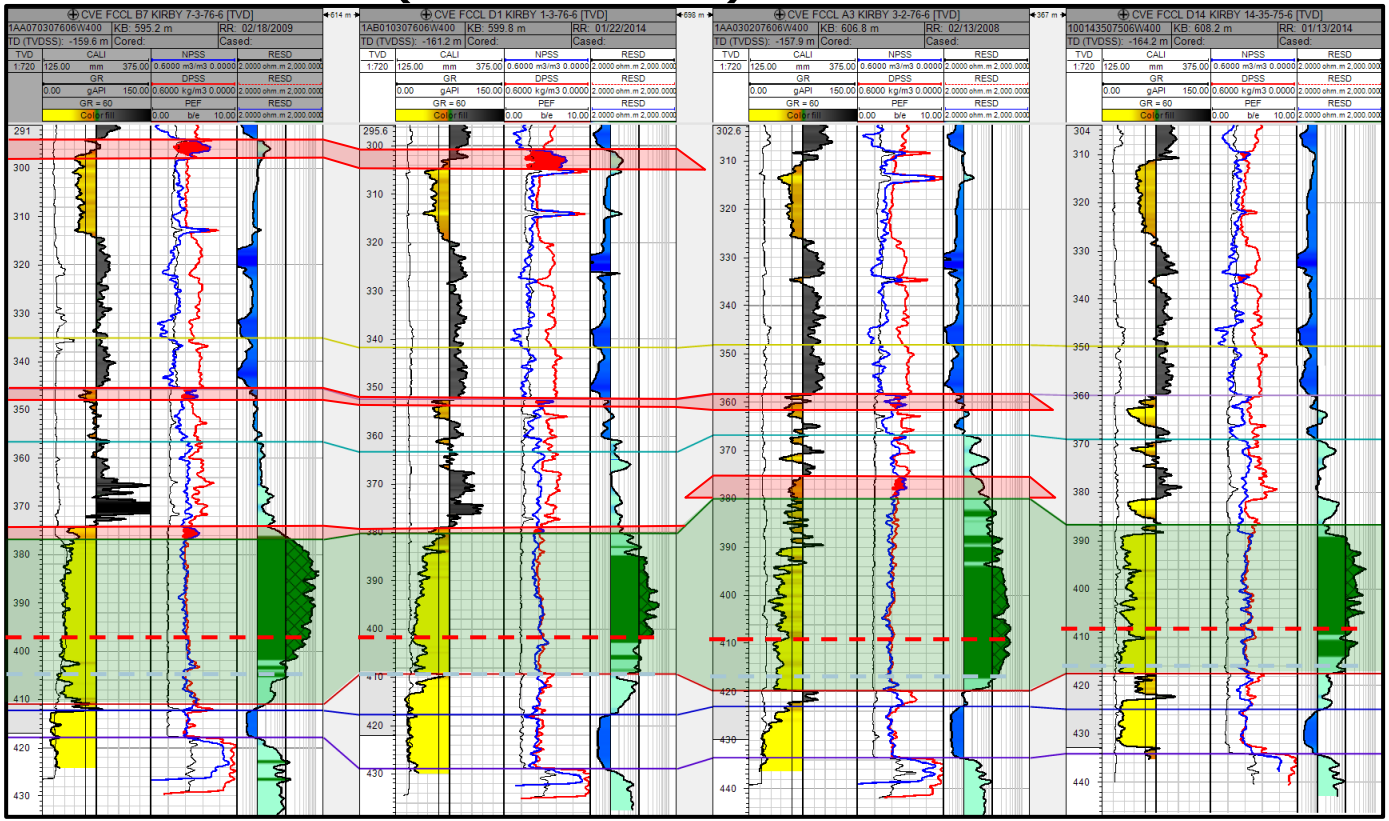
WBSK (T21)

T11

MCMR

SAGD Pay

SAGD Base
Water Top
Paleo

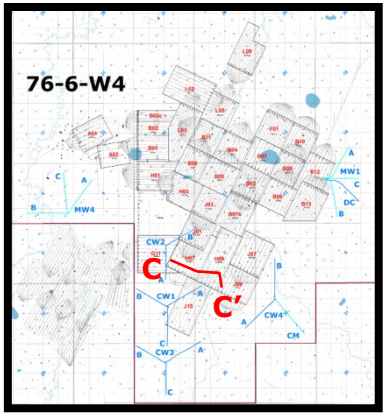


Identified Gas

McM SAGD Pay

Injector Level (est.)

Producer Level (est.)



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OBIP Volumes

- Project Area OBIP
  - 776 MMm^3
- Development Area OBIP
  - 767 MMm^3
- Combined Active Well Patterns OBIP
  - 276 MMm^3
- Cumulative % Recovery
  - 42%

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Reservoir properties

Reservoir Characteristics	Christina Lake Project Area	Kirby East Project Area	Approved Development Area
Reservoir Depth (m subsea)	170 - 245	170 - 245	170 - 245
Average SAGD Pay Thickness (m)	Up to 45+	Up to 25+	Up to 35+
Porosity (%)	31%	29%	30%
Horizontal Permeability (D)	Up to 10	Up to 8	Up to 10
Vertical Permeability (D)	Up to 7	Up to 6	Up to 7
Oil Saturation (%)	~80%	~75%	~80%
Water Saturation (%)	~20%	~25%	~20%
Original Reservoir Pressure (kPa)	~2500	~2500	~2500
Original Reservoir Temperature (°C)	12°C	12°C	12°C

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POIP & OBIP & recovery per pad

Pad	Area (m2)	Height (m)	Average Permeability (D)	Porosity (%)	So (%)	POIP (Mm3)	OBIP (Mm3)	Cum Oil (Mm3) to Dec 31, 2022	Recovery % POIP	Recovery % OBIP	Estimated Ultimate Recovery (Mm3)	Ultimate Recovery as % of POIP	Ultimate Recovery as % of OBIP
A01 PAD	514,091	27	6.0	32%	90%	3,888	6,096	2,463	63%	40%	2,541	65%	42%
A02 PAD	174,358	31	6.0	32%	88%	1,453	1,512	756	52%	50%	779	54%	52%
B01 PAD	655,033	40	6.0	32%	85%	7,111	7,310	4,726	66%	65%	4,869	68%	67%
B02 PAD	333,162	45	6.0	32%	86%	4,183	4,228	3,239	77%	77%	3,338	80%	79%
B02C PAD	322,343	34	6.0	32%	87%	3,075	3,113	2,166	70%	70%	2,232	73%	72%
B03 PAD	677,534	44	6.0	31%	85%	7,630	7,840	5,981	78%	76%	6,163	81%	79%
B04 PAD	652,375	50	6.0	30%	83%	8,444	8,684	6,359	75%	73%	6,550	78%	75%
B05 PAD	731,534	51	6.0	30%	83%	9,445	9,633	6,894	73%	72%	7,103	75%	74%
B06 PAD	723,216	36	6.0	30%	79%	6,429	7,722	4,958	77%	64%	5,100	79%	66%
B07 PAD	675,472	47	6.0	30%	85%	8,371	8,534	5,906	71%	69%	6,083	73%	71%
B07B PAD	859,517	36	6.0	29%	84%	7,506	8,869	4,020	54%	45%	4,139	55%	47%
B08 PAD	568,267	38	6.0	33%	89%	6,300	6,536	4,289	68%	66%	4,419	70%	68%
B09 PAD	558,380	48	6.0	33%	85%	7,347	7,633	5,020	68%	66%	5,171	70%	68%
B10 PAD	646,049	35	6.0	32%	88%	6,553	7,038	2,760	42%	39%	2,844	43%	40%
B11 PAD	640,668	44	6.0	32%	88%	7,756	8,037	5,135	66%	64%	5,294	68%	66%
B12 PAD	652,771	26	6.0	31%	84%	4,505	4,903	1,502	33%	31%	1,548	34%	32%
B13 PAD	841,965	29	6.0	31%	85%	6,464	7,312	3,402	53%	47%	3,499	54%	48%
B17 PAD	641,423	21	6.0	33%	88%	3,807	4,951	544	14%	11%	561	15%	11%
B19 PAD	959,618	30	6.0	33%	86%	8,266	9,084	811	10%	9%	837	10%	9%
B23 PAD	1,227,378	21	6.0	29%	86%	6,559	7,488	551	8%	7%	569	9%	8%
F01 PAD	700,230	38	6.0	32%	86%	7,285	7,700	4,499	62%	58%	4,636	64%	60%
G05 PAD	1,526,523	24	6.0	32%	87%	10,316	13,903	632	6%	5%	651	6%	5%
G09 PAD	1,345,511	24	6.0	33%	89%	9,633	13,677	960	10%	7%	989	10%	7%
G11 PAD	917,788	25	6.0	32%	88%	6,458	7,286	1,384	21%	19%	1,426	22%	20%
H01 PAD	773,342	30	6.0	33%	87%	6,795	7,585	3,917	58%	52%	4,035	59%	53%
H03 PAD	658,249	26	6.0	34%	90%	5,379	6,871	3,413	63%	50%	3,515	65%	51%
H07 PAD	787,787	24	6.0	33%	89%	5,555	6,074	1,375	25%	23%	1,418	26%	23%
H09 PAD	934,727	28	6.0	33%	89%	7,794	8,550	1,872	24%	22%	1,929	25%	23%
J01 PAD	600,387	23	6.0	32%	86%	3,795	5,236	2,191	58%	42%	2,259	60%	43%
J03 PAD	561,300	38	6.0	33%	88%	6,301	7,673	5,032	80%	66%	5,185	82%	68%
J07 PAD	856,438	25	6.0	32%	89%	6,135	7,582	2,502	41%	33%	2,579	42%	34%
J09 PAD	758,443	31	6.0	32%	87%	6,484	7,000	2,630	41%	38%	2,710	42%	39%
J15 PAD	991,475	26	6.0	31%	88%	6,953	7,418	1,609	23%	22%	1,688	24%	23%
J17 PAD	992,561	22	6.0	32%	89%	6,516	7,780	1,533	24%	20%	1,579	24%	20%
L02 PAD	955,312	29	6.0	32%	88%	7,685	9,180	1,496	19%	16%	1,541	20%	17%
L03 PAD	716,007	33	6.0	34%	89%	7,200	7,522	3,762	52%	50%	3,874	54%	51%
L05 PAD	475,523	28	6.0	29%	86%	3,499	4,464	2,303	66%	52%	2,375	68%	53%
L09 PAD	754,344	27	6.0	32%	90%	6,011	6,642	2,876	48%	43%	2,963	49%	45%
Total CL	**28,361,101**					**244,885**	**278,670**	**115,467**	**47%**	**41%**	**118,989**	**49%**	**43%**

**As of December 31st, 2022*

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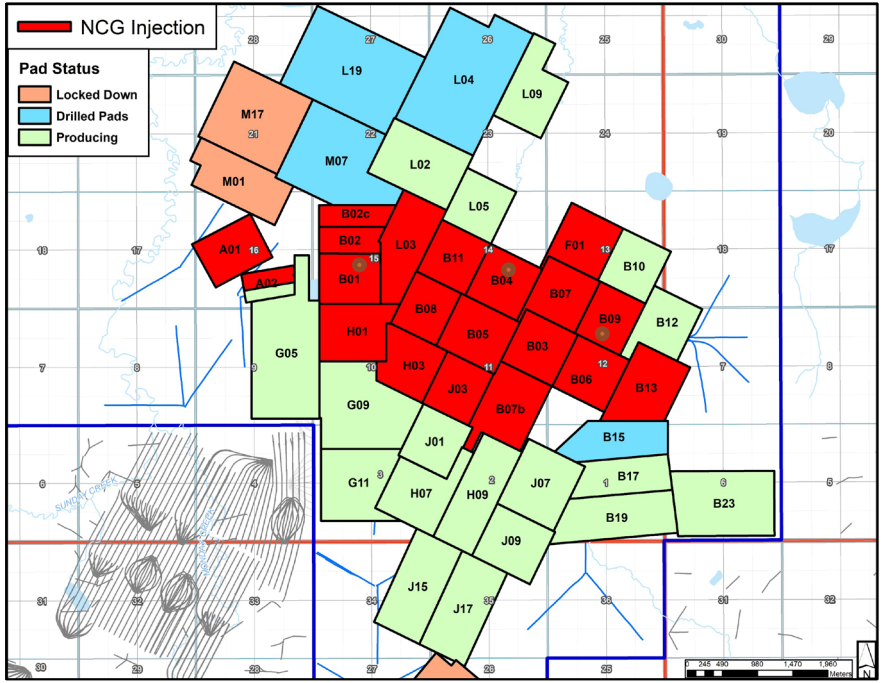
Map of co-injection wells



● 6-15, 7-14, 14-12 wells

Non-condensable gas

- NCG injected in 6-15 well, 7-14 well, 14-12 well, and wells on A01, A02, B01, B02, B02C, B03, B04, B05, B06, B07, B07b, B08, B09, B11, B13, H01, H03, J03, L03 and F01 pads
- Fuel gas during co-injection with minimum 50 t/d during co-injection*; 100% gas mol fraction during blowdown
- Composition of the injected non-condensable gas is methane (fuel gas)
- Taking into account formation GOR, daily recovery of injected NCG fluids ranges from 50%-80%. This range fluctuates due to changes in daily operations

Solvent

- No solvent injection at CL, currently

*Based on current approval of 50 t/d minimum steam rate with no maximum gas injection rate per injector well on pad average basis during co-injection.

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Injection Strategy and Impacts

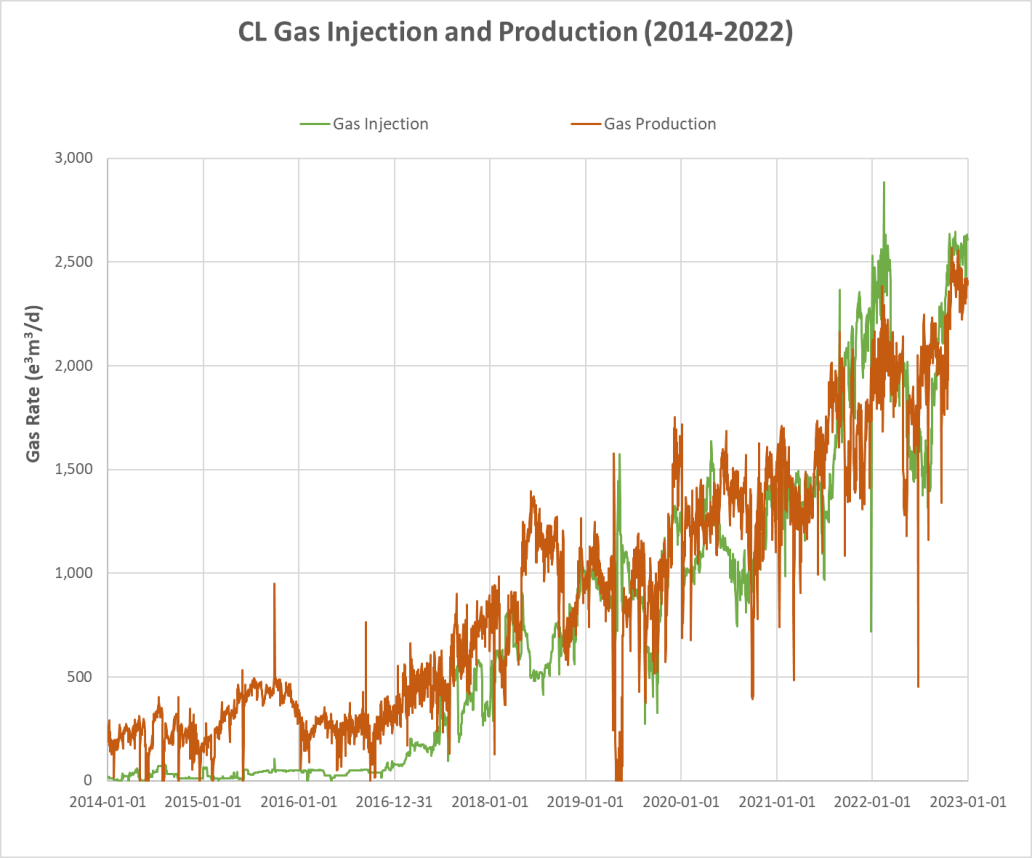
NCG Injection commencement is based on:

- Pads with high RF
- Pads with high SOR/declining oil rates

Steam cuts are typically made in 25% increments.

Impact of co-injection:

- Trials underway to optimize late life strategy and reduce gas production
- Based on data to date, Cenovus does not expect material impact to ultimate recovery due to co-injection



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Subsection 4.3 8
Surface

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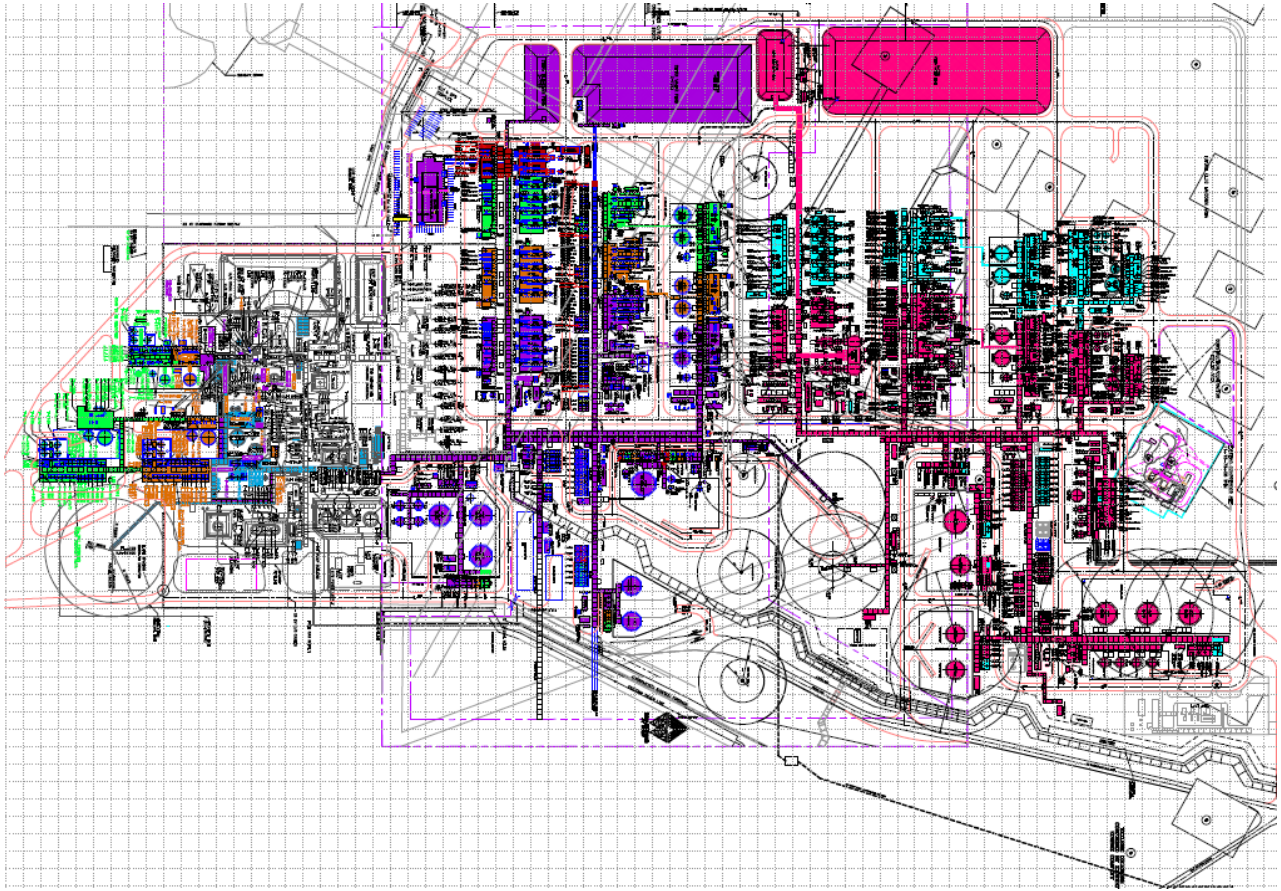
Overall plot plan



PHASE 1B
PHASE 1C
PHASE 1D
PHASE 1E
PHASE BB
PHASE 1F
PHASE 1G

All Phases indicated on Plot Plan have been built and in operation.

A high-resolution drawing has been included as an attachment (CL1-44-PLT-00-0010-002)

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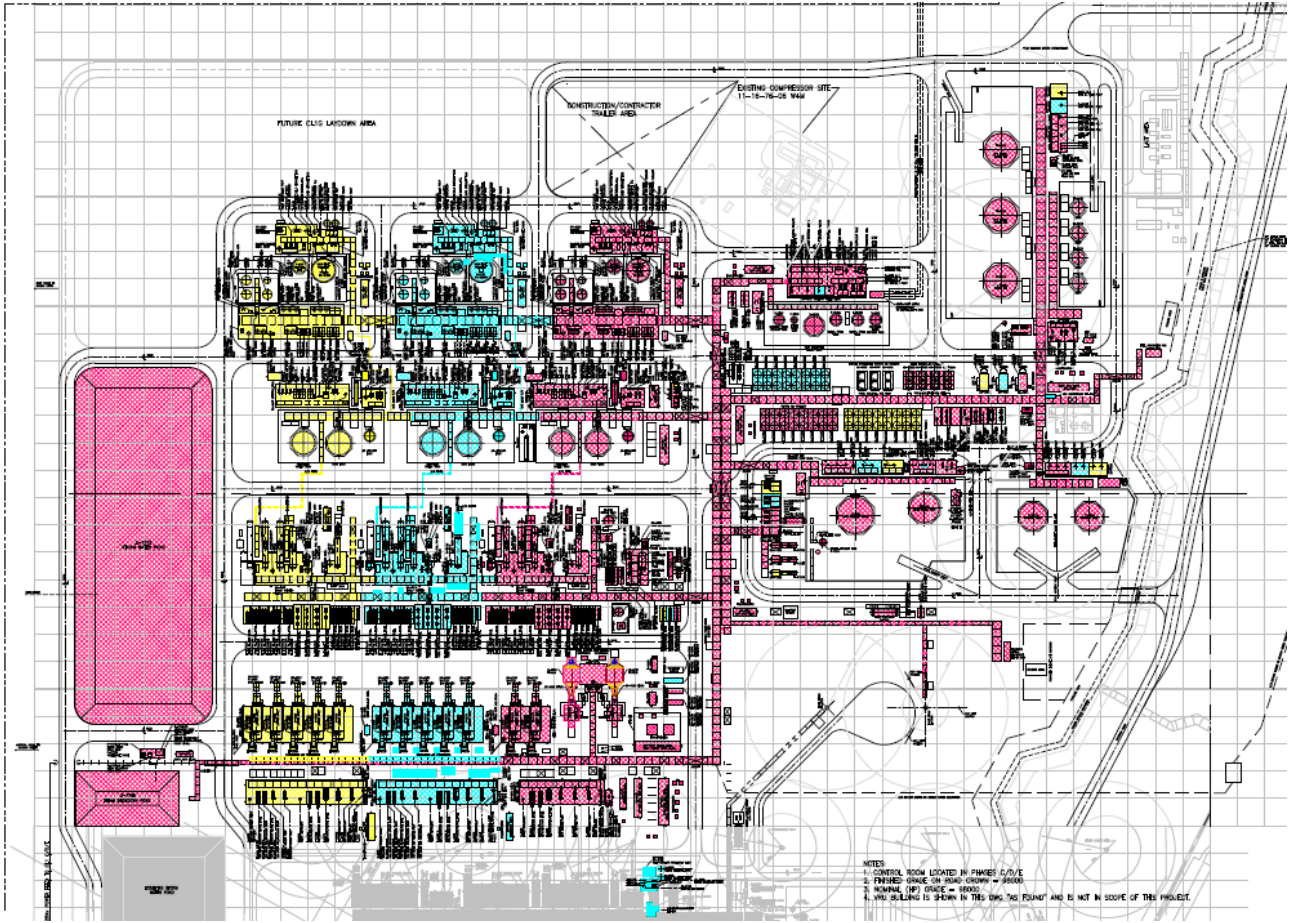
Plot Plan with Future Phase H



PHASE 1F

PHASE 1G

PHASE 1H

Phase H has not been constructed, nor in operation

A high-resolution drawing has been included as an attachment (CL1-44-PLT-00-0040-001)

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Source Water Infrastructure

Fresh water source wells – Empress Aquifer :

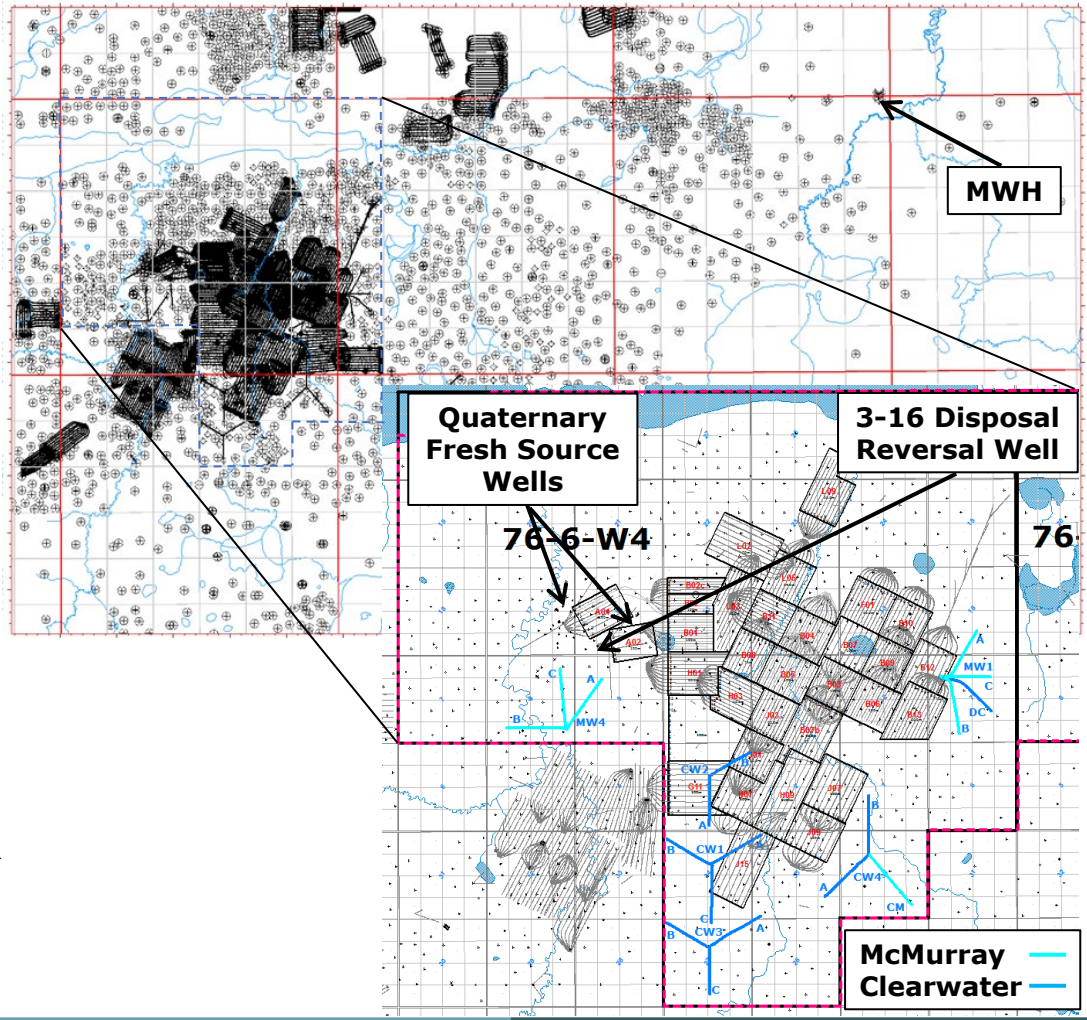
- Two wells at 09-17-076-06W4M (TDS ~440-560 mg/L)
- One well at 06-16-076-06W4M (TDS ~380-650 mg/L)

Brackish water source wells – Clearwater B Aquifer:

•CW1-A 1F1/13-35-075-06W4/00	TDS ~ 7,400 mg/L
•CW1-B 1F1/13-34-075-06W4/00	TDS ~ 5,070 mg/L
•CW1-C 1F1/15-27-075-06W4/00	TDS ~ 7,780 mg/L
•CW2-A 1F1/16-03-076-06W4/00	TDS ~ 4,600 mg/L
•CW2-B 1F1/02-03-076-06W4/00	TDS ~ 5,580 mg/L
•CW3-A 100/04-35-075-06W4/00	TDS ~ 9,730 mg/L
•CW3-B 100/13-27-075-06W4/00	TDS ~ 8,900 mg/L
•CW3-C 100/02-27-075-06W4/00	TDS ~ 11,700 mg/L
•CW4-A 1F1/01-35-075-06W4	TDS ~ 13,200 mg/L
•CW4-B 1F1/06-01-076-06W4	TDS ~ 8,800 mg/L
•MW1-DC 1F1/07-07-076-05W4	TDS ~ 4,300 mg/L

McMurray water source wells:

•MW1-A 1F1/07-18-076-05W4	TDS ~ 16,880 mg/L
•MW1-B 1F1/03-07-076-05W4 (not in use)	TDS ~ 16,520 mg/L
•MW1-C 1F1/09-07-076-05W4	TDS ~ 16,420 mg/L
•MW4-A 1F3/11-09-076-06W4	TDS ~ 10,850 mg/L
•MW4-B 1F1/04-08-076-06W4	TDS ~ 11,300 mg/L
•MW4-C 1F1/16-08-076-06W4	TDS ~ 10,990 mg/L
•CW4-C 1F1/01-36-075-06W4	TDS ~ 18,600 mg/L
•3-16 1F5/03-16-076-06W4/00 TDS ~ 8,400 mg/L	
•MWH 1F1/01-01-077-04W4 (not in use)	
•MWH 1F1/02-01-077-04W4 (not in use)	MWH TDS ~ 13,700-16,800 mg/L
•MWH 1F2/01-01-077-04W4 (not in use)	
•MWH 1F1/15-36-076-04W4 (not in use)	
•MWH 1F1/16-36-076-04W4 (not in use)	
•MWH 1F2/16-36-076-04W4 (not in use)	



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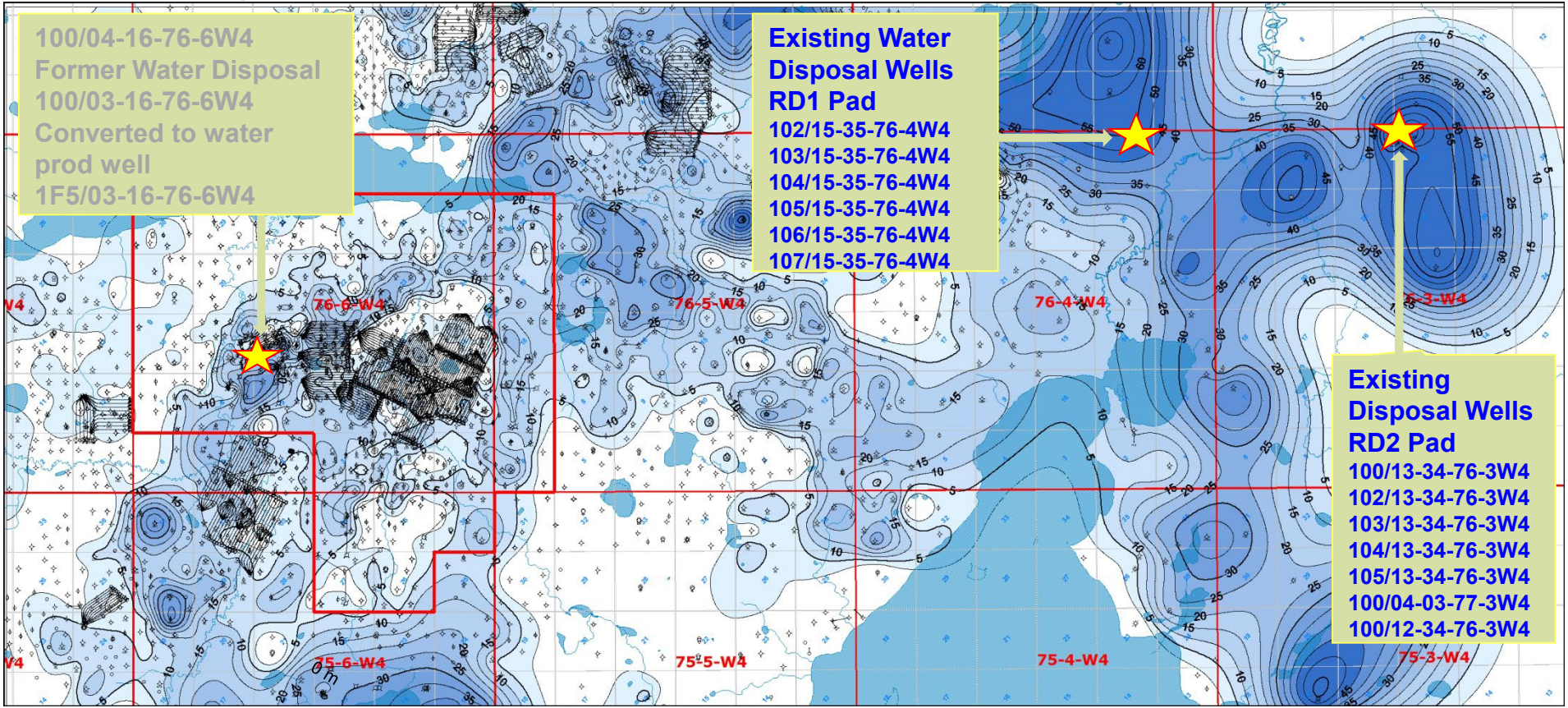
McMurray water disposal wells



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Facility summary

Skim/Sales Oil Tank Vent Gas Project

- Phase CDE skim tank vent gas collection and scavenger contactor project construction completed in Q4 2022. Mechanical issues have delayed the start-up of this project until Q3 2023.
- Phase F/G sales oil tank tie-in project completed and online in Q4 2022.

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Plant performance

Steam

- System capacity 83,300 t/d of steam
- Average flowrate for 2022 of 78,010 t/d | 94% of Capacity
- Phase A to H approved steam capacity is 92,618 t/d

Oil

- System capacity 43,880 Sm^3/d of oil (276,000 bbl/d)
- Average flowrate for 2022 of 39,222 Sm^3/d (246,699 bbl/d) | 89% of Capacity
- Phase A to H approved annual average bitumen capacity is 49,284 Sm^3/d (310,000 bbl/d)

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Subsection 4.4 9-12 Historical and Upcoming Activity

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Pad Abandonments

- No pad abandonments are currently planned at Christina Lake in the next 5 years.

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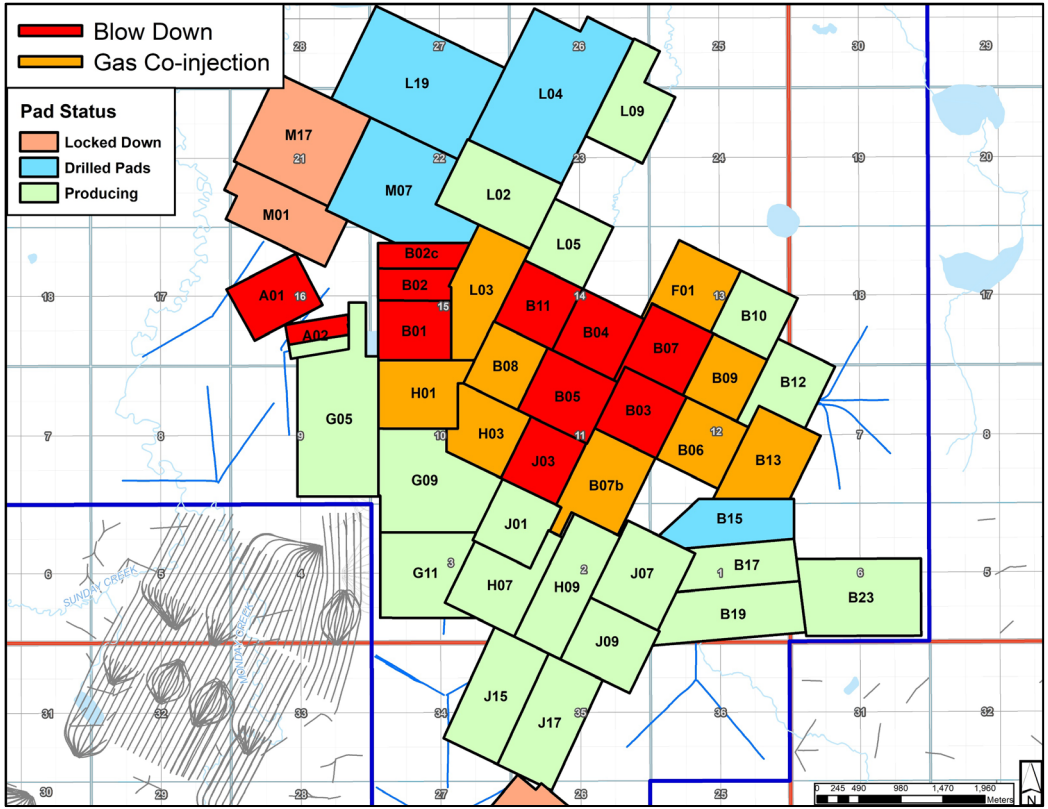
Well patterns with active gas injection



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2022 OSCA & EPEA application/approval summary

Act	Application No.	Application Description	Approval Date
OSCA	1936327	L04 Pad Existing Wells Thermal Compatibility Assessment	2022-04-26 (8591XXX)
OSCA	1937679	H11 Pad Trajectory Update Application	2022-06-17 (8591YYY)

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Facility modifications

Skim/Sales Oil Tank Vent Gas Project

- Phase CDE skim tank vent gas collection and scavenger contactor project construction completed in Q4 2022. Mechanical issues have delayed the start-up of this project until Q3 2023.
- Phase F/G sales oil tank tie-in project completed and online in Q4 2022.

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Facility performance

Process Treating Area:

- New emulsion breaker improved treating which allowed reduced chemical usage, increased treater density targets, and reduced diluent burn across facility
- Re-routed Phase F/G vapor recovery unit to the sulphur recovery unit
- Completed Phase F/G turnaround in April/May 2022 and found inlet degasser control valves to be washed out. Mitigation plan implemented
- Phases A-G constrained due to gas capacity limitations
- Slug Catcher liquids management
    - Re-routing slug catcher liquids from skim tank to FWKO (Phase F 2023)

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Facility performance

De-oiling Area:

- Phase F/G Skim tanks offline for ABSA regulatory inspection
- Reduced production impact of Phase F/G turnaround by routing Phase F produced water to Phase G while Phase F skim tank was offline
- Completed internal modifications to Phase F/G IGF (induced gas flotation) units allowing better efficiency when operating at high rates
- Skim tank oil-in-water analyzer trial to identify upstream excursions and prevent downstream process upsets
    - Moving OIW analyzer further upstream in 2023 to improve performance

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Facility performance

Water Treatment Area:

- Received approval for term license 00082524 for fresh water use from 9-17A/B and 11-16 wells
- Started trials for new coagulant and flocculant chemistries to improve WLS performance and stability
- Experienced increased after filter plugging issues resulting in significant cleaning efforts and media replacements
- Re-instated sub-surface wash header in V-1530D however experienced premature failure; evaluating other methods to reduce differential pressure across ion exchange vessels in this phase

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Facility performance

Steam Generation & Utilities Area:

- Achieved a new steam record and high steam reliability in 2022
- Experienced significant downtime on GT-2900/2950 due to mechanical repairs
  - Extended HRSG outages as a result of these issues
- Managed high produced gas rates while still meeting all sulphur recovery requirements
- Completed Phase F/G SRU regulatory outage, cleaning and valve upgrades to reduce hydraulic limitations

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Pilots/technical innovations

Advanced Process Control - Heat Integration

- Made improvements shifting cooling between skim tanks, sales oil tanks, free water knock-outs, maximizing boiler feed water temperature when possible.
- Tested temperature limitations and built business case to add additional glycol coolers for Phase F/G (2024 target install)

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2022 Non-compliance Summary – EPEA

Date	Non compliance	Follow-up
2022-01-16	EDGE Ref# 387494. Air monitoring station failed to meet 90% uptime for wind speed and direction due to frozen wind sensor.	Wind sensor repaired and brought back on-line.
2022-03-07	EDGE Ref# 389603. Air monitoring station failed to meet 90% uptime for NO2 analyzer due to degraded sample pump and ruptured exhaust sample line.	Sample pump and exhaust repaired and re-calibrated analyzer.
2022-03-11	EDGE Ref# 388603. CEMS unit B-2100 failed to meet 90% availability due to analyzer malfunction.	Linearity check conducted and analyzer adjusted.
2022-05-11	EDGE Ref# 390527. Missing samples for Phase FG storm pond pump off.	Procedures checked to ensure proper sampling prior to pump-off.
2022-08-09	EDGE Ref# 402450. CEMS unit B-3500 failed to meet 90% availability due to FloSic flow rate meter malfunction.	Replaced and re-calibrated FloSic meter.
2022-08-29	EDGE Ref# 403527. B-3460 exceeded the hourly NOx emission limit due to lower heating value setpoint issue.	Heating value setpoint corrected.
2022-09-01	EDGE Ref# 404346. Air monitoring station failed to meet 90% uptime for wind speed and direction due to misaligned sensor.	Sensor re-aligned and verified accuracy.
2022-09-15	EDGE Ref#s 405614, 405615, 405616. CEMS units B-2360, B-3100 and B-3460 failed to meet 90% uptime due to failed CGAs.	Maintenance performed on analyzers, subsequent CGAs met requirements.
2022-10-03	EDGE Ref# 405220. B-2360 exceeded the hourly NOx emission limit due to outer burner ring outage.	DCS programming re-loaded and burner system returned to normal operation.

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Future plans

Potential Future Applications

- H11 Source/Disposal Well

Future Plant Activity

- Narrows Lake tie-back
- Relocate Narrows Lake Glycol Coolers to CL
- Casing Gas Re-injection at B04/B08 Pads
- VRU Compressor Project (Sulphur management)
- Skim/Sales Tank Vent Gas Project (Sulphur management)
- Phase H (not constructed) is on hold

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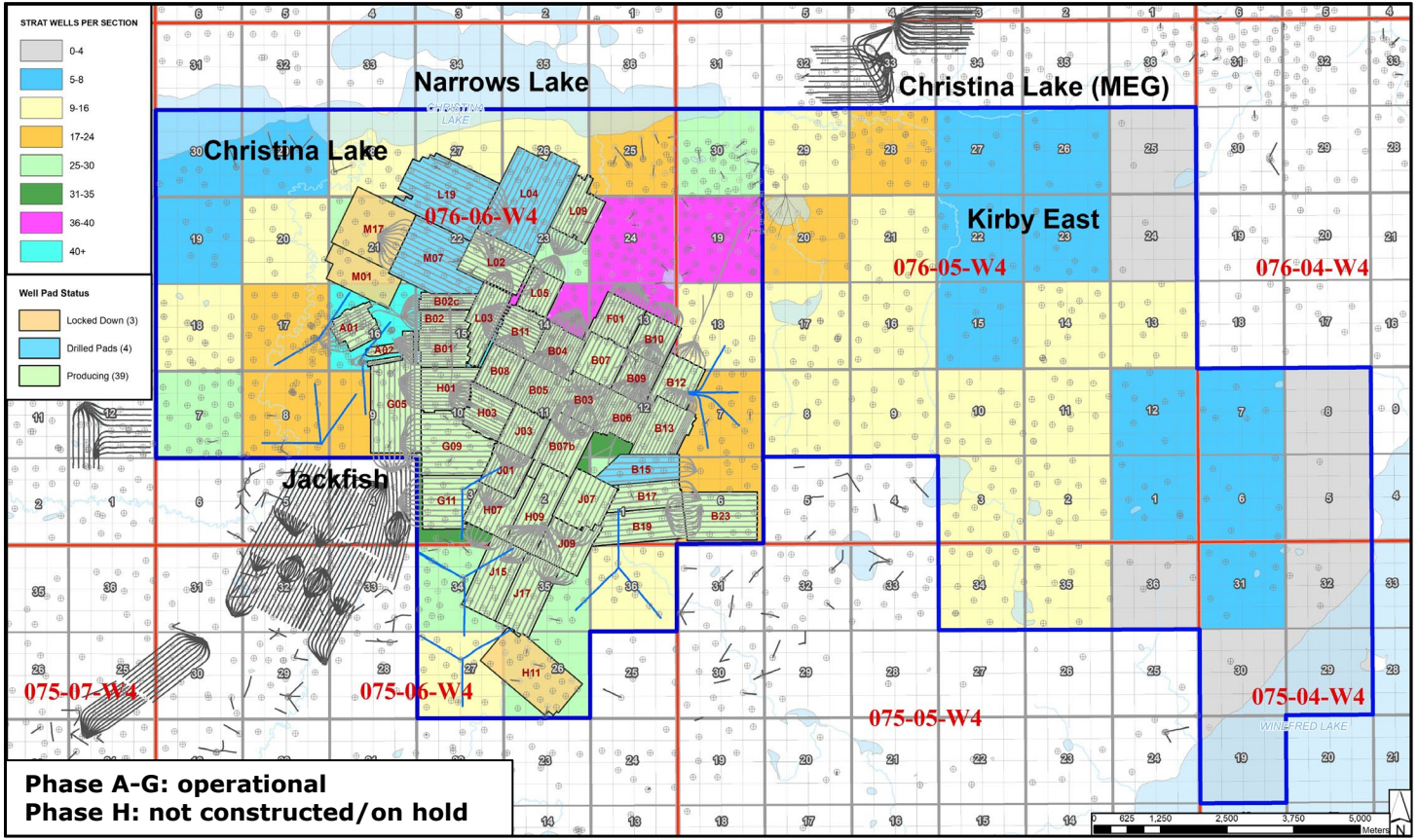
Planned development

* No new strat wells drilled in 2022



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Questions

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